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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,623	12/24/2003	Ren-Kang Chiou	ML-16	1622
23933	7590	09/30/2005	EXAMINER	
STUART T AUVINEN 429 26TH AVENUE SANTA CRUZ, CA 95062-5319			CHANDRAN, BIJU INDIRA	
			ART UNIT	PAPER NUMBER
			2835	

DATE MAILED: 09/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/707,623	CHIOU ET AL.	
	Examiner	Art Unit	
	Biju Chandran	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12/24/03, 4/7/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

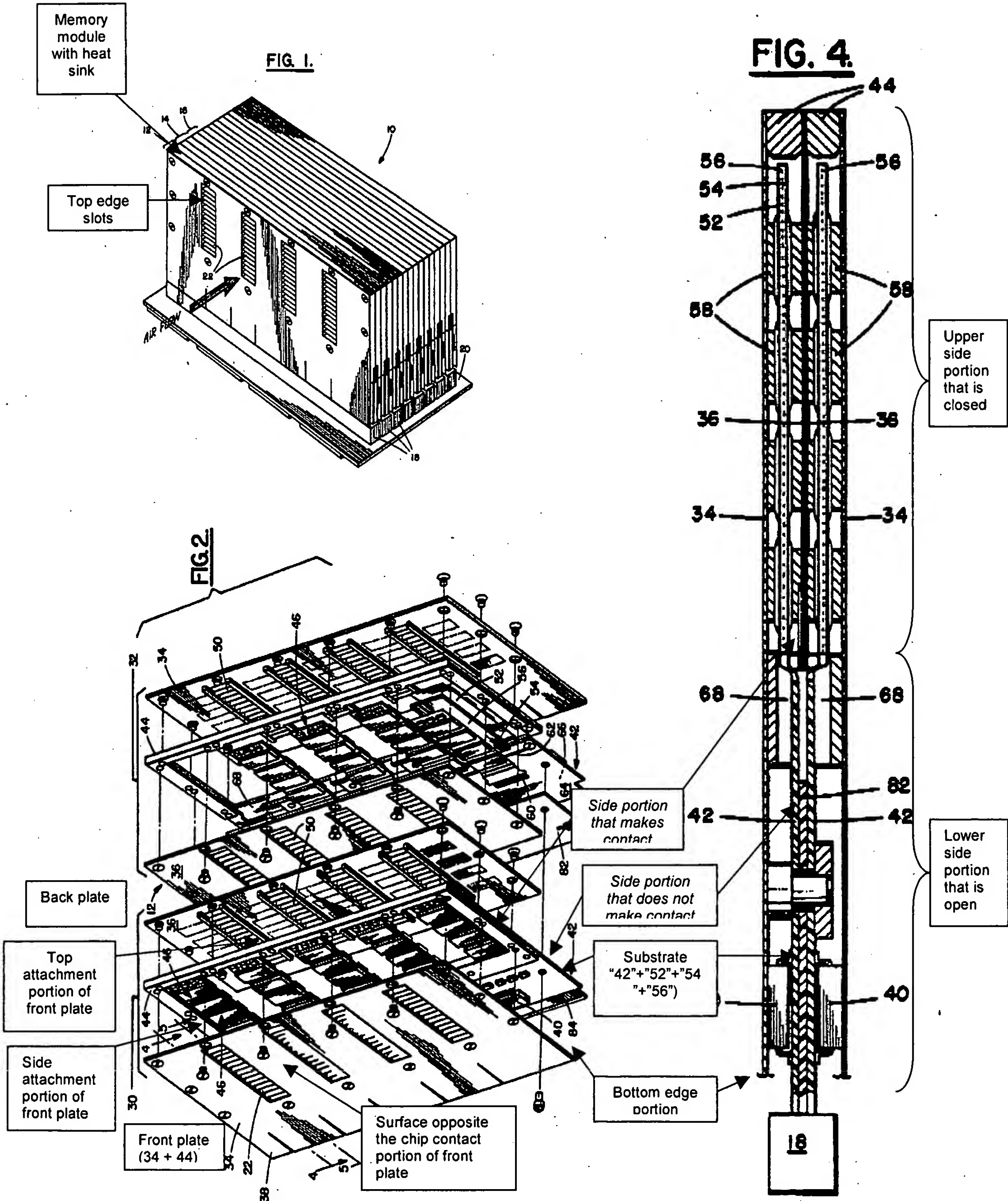
1. Claim 1 rejected under 35 U.S.C. 103(a) as being unpatentable over Cipolla et al. (U.S. Patent 5,268,815).

Cipolla et al. teaches the claimed memory module heat sink attachment comprising a front plate (34 + 44) for attaching to the front surface of the memory module, a back plate (36) for attaching to a back surface of the memory module. Each plate comprises: a heat transfer area for making thermal contact with memory chips (58) mounted on the memory module, a bottom edge portion that provides a bottom opening between the plate and the memory module for an entire length of a bottom edge when the plate is attached to the memory module, the bottom edge of the memory module containing metal contacts (84) for making electrical contact to a

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memory module socket (18); a top attachment portion for making contact with a substrate (made up of sub assemblies 42+52+54+56) of the memory module near a top edge that is opposite the bottom edge of the memory module, fastener holes for fasteners in the top attachment portion, the fasteners for fixedly attaching the plates to the substrate of the memory module, a pair of side portions that each make contact with the substrate of the memory module in an upper side portion near the top edge, but do not make contact with the substrate for a lower side portion near the bottom edge; and top-edge slots (22) formed near the top edge of the plate.

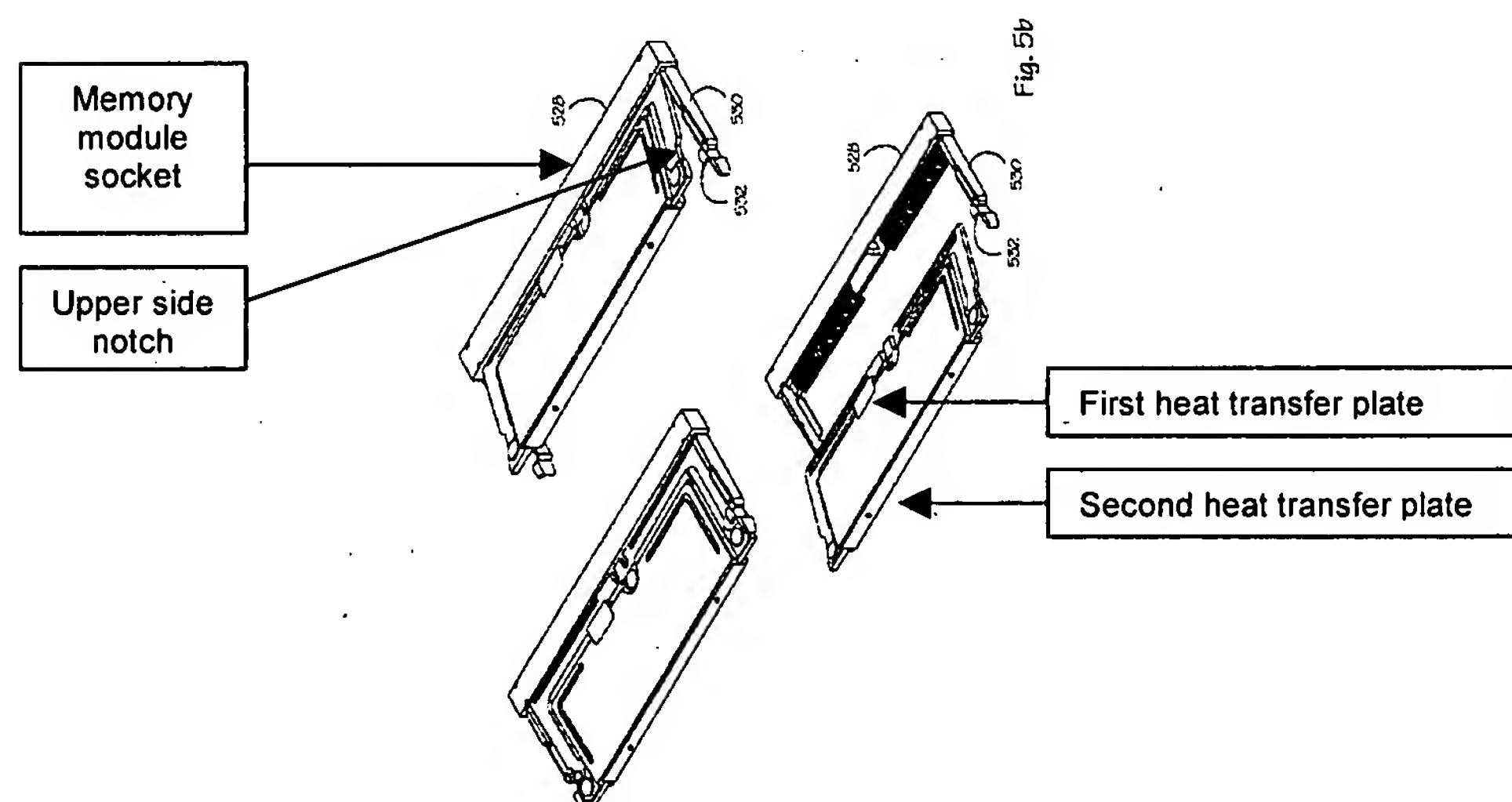
Cipolla et al. does not disclose expressly top-edge slots formed in the top attachment portion of the plate. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to extend the slots taught by Cipolla et al. to the attachment portion of the plate to increase the airflow and thereby enhance cooling.



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2. Claim 2-11 rejected under 35 U.S.C. 103(a) as being unpatentable over Cipolla et al. (U.S. Patent 5,268,815), in view of Ali et al. (U.S. Patent 6,188,576 B1).

- Regarding claim 2, Cipolla et al. teaches the invention set forth in claim 1, and further teach an upper side portion that extends from the top edge and a lower side portion extends from the bottom edge, whereby the upper side portion is closed by the plate contacting the substrate and the lower side portion is open, with a gap between the plate and the substrate. Cipolla et al. does not expressly disclose an upper side notch in the substrate. Ali et al. discloses a memory module substrate with an upper side notch along with a heat sink with a first



heat transfer plate and a second heat transfer plate. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the substrate taught by Cipolla et al. to

incorporate the upper side notch taught by Ali et al., to enable the use of the memory module with sockets that include protruding arms (530) that are designed to receive and secure the module (Ali et al., column 4, paragraph 32-36).

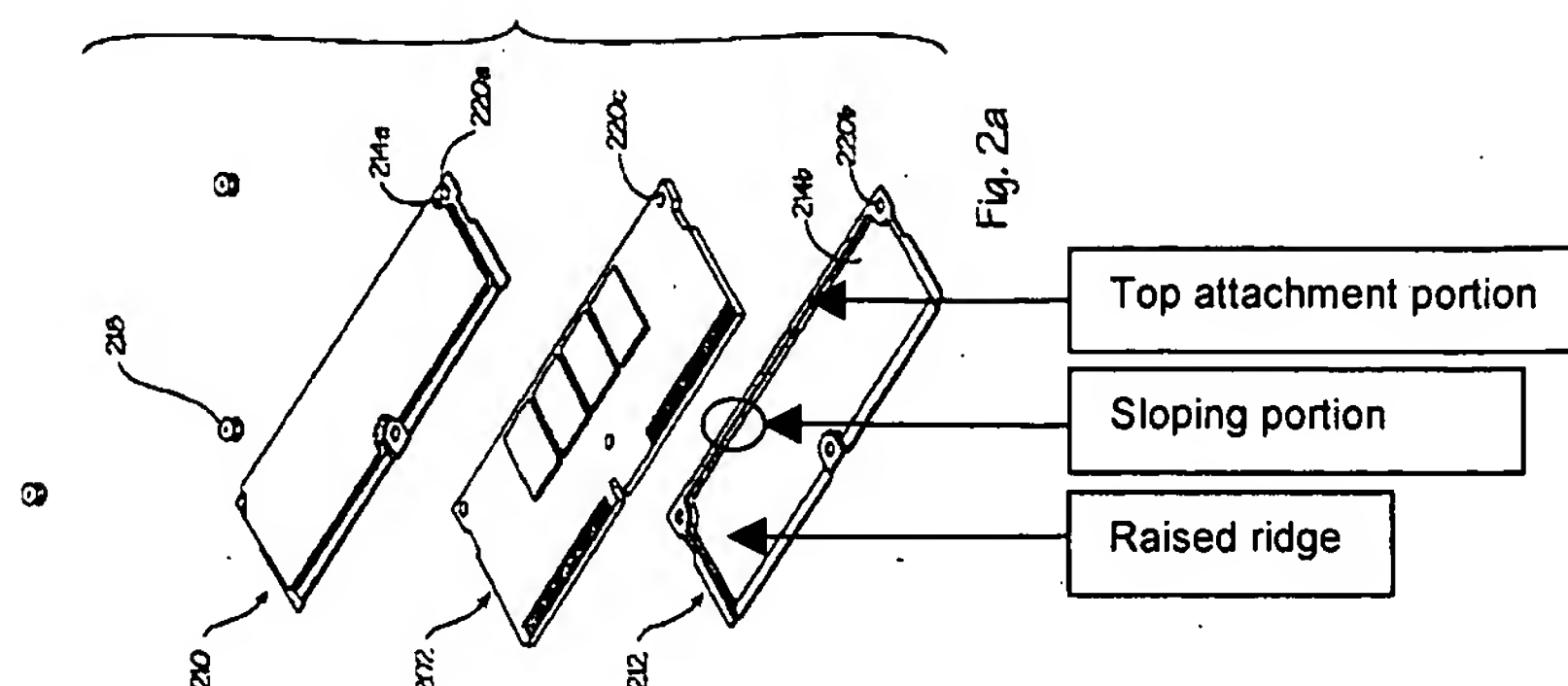
- Regarding claim 3, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1 and 2. Cipolla et al. does not expressly disclose an attachment portion that contacts the substrate for an entire length of the top edge of the substrate, whereby the top attachment portion contacts the substrate above the top-edge slots. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to attach the substrate along the entire length of the top edge of the substrate to increase the rigidity of the substrate.
- Regarding claim 4, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1, 2 and 3, and further discloses contact portions that surround the fastener holes in the top attachment portion. Cipolla et al. does not expressly disclose top-edge slots that extend to the top edge, dividing the contact portions of the top attachment portion. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to extend the top edge slots to the top edge of the front plate (34 + 44) dividing the contact portions of the top attachment portion, to increase the air flow through the module and improve cooling.

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- Regarding claim 5, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1-4. Cipolla et al. further disclose fastener hole locations comprising: a top-left fastener hole near a top-left corner between the top attachment portion and a left side portion of the pair of side portions, a top-right fastener hole near a top-right corner between the top attachment portion and a right side portion of the pair of side portions. Cipolla et al. does not expressly disclose a top-center fastener hole between the top-edge slots in the top attachment portion. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify the fastener locations taught by Cipolla et al. to include fastener locations between the top edge slots in the top attachment portion to increase the rigidity of the package (column 6, paragraph 35).
- Regarding claim 6, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1-5. Cipolla et al. further disclose a bottom fastener hole in the bottom edge portion.
- Regarding claim 7, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1-6. Cipolla et al. does not expressly disclose the bottom fastener hole location that is about halfway between the pair of side portions. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify the fastener locations taught by Cipolla et al. to include a bottom fastener

hole location that is about halfway between the pair of side portions, to improve overall rigidity of the assembled memory module.

- Regarding claim 8, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1-7. Cipolla et al. further discloses the heat transfer area (34) to be a depression in the plate (34 + 44) surrounded by a raised ridge in the plate (44).
- Regarding claim 9, Cipolla et al., as modified by Ali et al., discloses all the limitations in claims 1-8. Cipolla et al. do not disclose top-edge slots that are formed on a sloping portion of the plate between the raised ridge and the top attachment portion. Ali et al. (U.S. Patent 6,188,576 B1) discloses a heat sink with a first heat transfer plate and a second heat transfer plate, wherein the first and second heat transfer plates have a sloping portion between the raised ridge and the top attachment portion. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the location of the notches in the memory module heat sink attachment taught by Cipolla et al. and to incorporate it in a sloping region between the raised ridge and the top attachment portion as taught by Ali et al. to improve the air flow through the module.



- Regarding claim 10, Cipolla et al., as modified by Ali et al., discloses all the limitations in this claims 1-9. Cipolla et al. further discloses top-edge slots that comprise two slots in the front and two slots in the back plate, whereby the four top-edge slots provide for airflow.
 - Regarding claim 11, Cipolla et al., as modified by Ali et al., discloses all the limitations in these claims 1-10. Cipolla et al. further discloses different connection mechanisms (column 6, paragraph 34).
3. Claim 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Cipolla et al. Cipolla et al. disclose a thermally-enhanced memory module comprising a substrate (42+52+54+56) having wiring traces formed therein (column 4, paragraph 55), metal contacts along a contactor edge of the substrate (84), the metal contacts for making electrical contact with a memory module socket (18), a first plurality of memory chips mounted on a first surface of the substrate (58), a first heat-transfer plate (34 + 44) having an

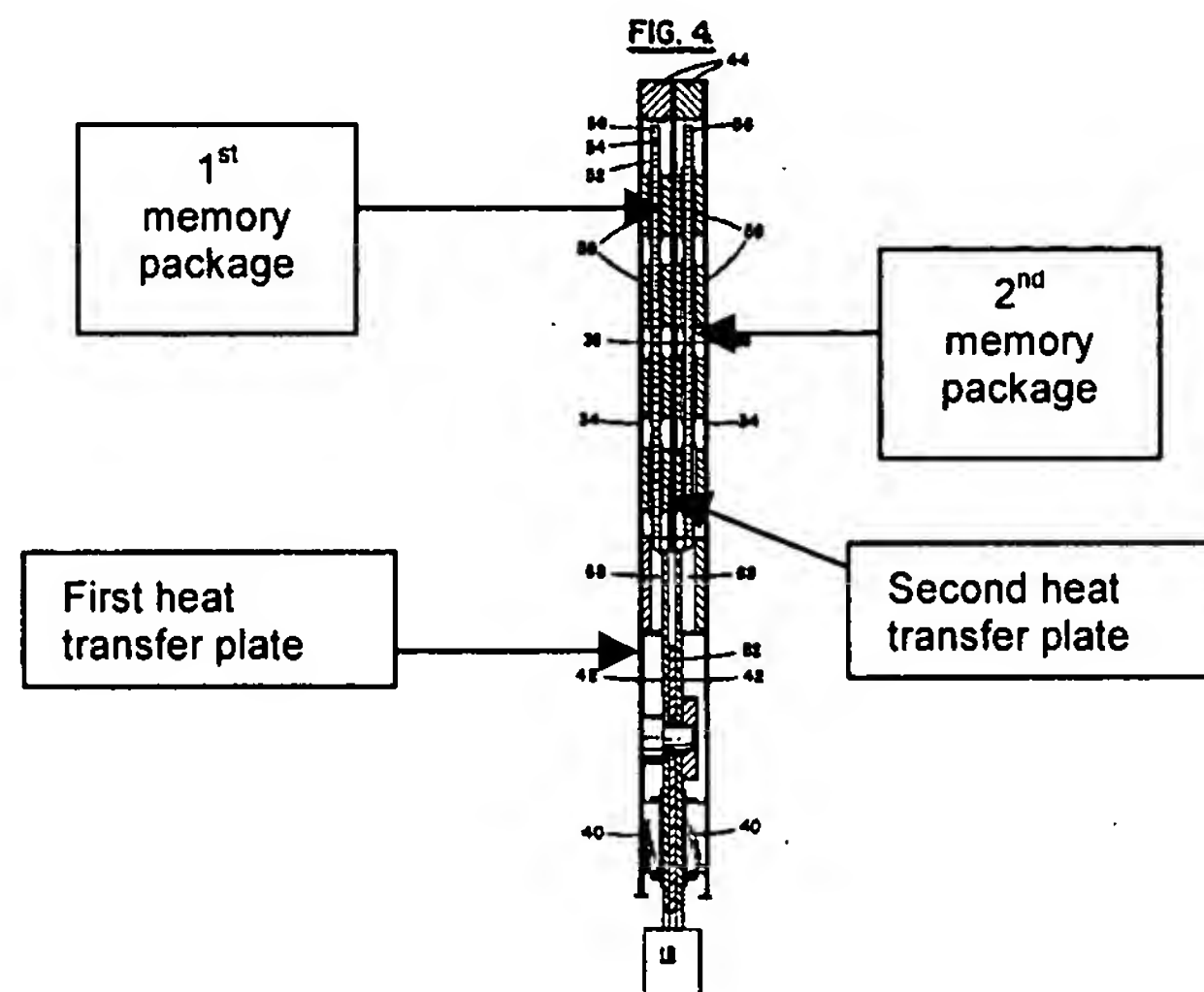
underside surface making thermal contact with the first plurality of memory chips (column 6, paragraph 40) and an exposed surface opposite the underside surface, the exposed surface for dissipating heat (column 2, paragraph 63); a contact side opening between the first heat transfer plate and the substrate near the contactor edge of the substrate, the contact-side opening allowing air flow to the first plurality of memory chips; a plurality of fasteners in the attachment portion that fixedly attach the first heat-transfer plate to the substrate; and a plurality of slots (22) through the first heat-transfer plate between the attachment portion and a chip-contact portion of the first heat-transfer plate that makes contact with the first plurality of memory chips; wherein the substrate further comprises fastener holes in the substrate for receiving the plurality of fasteners to fixedly attach the first heat-transfer plate to the substrate (column 6, paragraph 35), whereby heat-transfer is enhanced by air flow through the plurality of slots, past the plurality of memory chips, and through the contact-side opening (column 4, paragraph 10). Cipolla et al. do not expressly disclose an attachment portion of the first heat-transfer plate that contacts the substrate along an opposite edge that is opposite the contactor edge. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to attach the attachment portion of the first heat transfer plate along the top edge of the substrate also to increase the rigidity of the substrate.

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4. Claims 13-18 rejected under 35 U.S.C. 103(a) as being unpatentable over Cippola et al.

- Regarding claim 13, Cipolla et al. teaches the invention set forth in claim 12 and further teach; a second plurality of memory chips mounted on a second surface of the substrate that is opposite the first surface (see element '58' in Figure 4), a second heat-transfer plate (36) having an underside surface making thermal contact with the second plurality of memory chips (column 6, paragraph 35-40); a second contact-side opening between the second heat-transfer plate and the substrate near the contactor edge of the substrate, the second contact-side opening allowing air flow to the second plurality of memory chips, a plurality of fasteners in the attachment portion fixedly attach the second heat transfer plate to the substrate and to the first heat transfer plate, and a second plurality of slots (50) through the second heat-transfer plate between the attachment portion and a chip-contact portion of the second heat-transfer plate that makes contact with the second plurality of memory chips. Cipolla et al., does not disclose expressly an exposed surface opposite the underside surface in the second heat transfer plate, and an attachment portion of the second heat-transfer plate that contacts the substrate along an opposite edge of the contactor edge. The embodiment disclosed by Cipolla et al. in Figure 1 is for an 8-stack module, and the

description is made with reference to one of those stacks, which encompass two memory packages sandwiched together.



At the time the invention was made, it would have been obvious to a person of ordinary skill in the art, that to package singular memory packages, the second heat transfer plate disclosed by Cipolla et al. can be replaced by the duplicate of the first heat transfer plate, which when packaged in the single package configuration would have an exposed surface that is opposite the underside surface for dissipating heat. The motivation for this would be to decrease cost by minimizing the number of distinct piece parts. At the time the invention was made, it would also have been obvious to one of ordinary skill in the art to attach the substrate along an edge that is opposite to the contactor edge to increase the rigidity of the substrate.

- Regarding claim 14, Cipolla et al. disclose all the limitations in claim 13. Cipolla et al. does not expressly disclose an attachment portion that

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comprises an entire length of the opposite side of the substrate. At the time the invention was made, it would also have been obvious to one of ordinary skill in the art to use a second heat transfer plate that was a duplicate of the first heat transfer plate when packaging singular memory packages, and to attach the substrate along an entire length of the opposite edge of the substrate to increase the rigidity of the substrate.

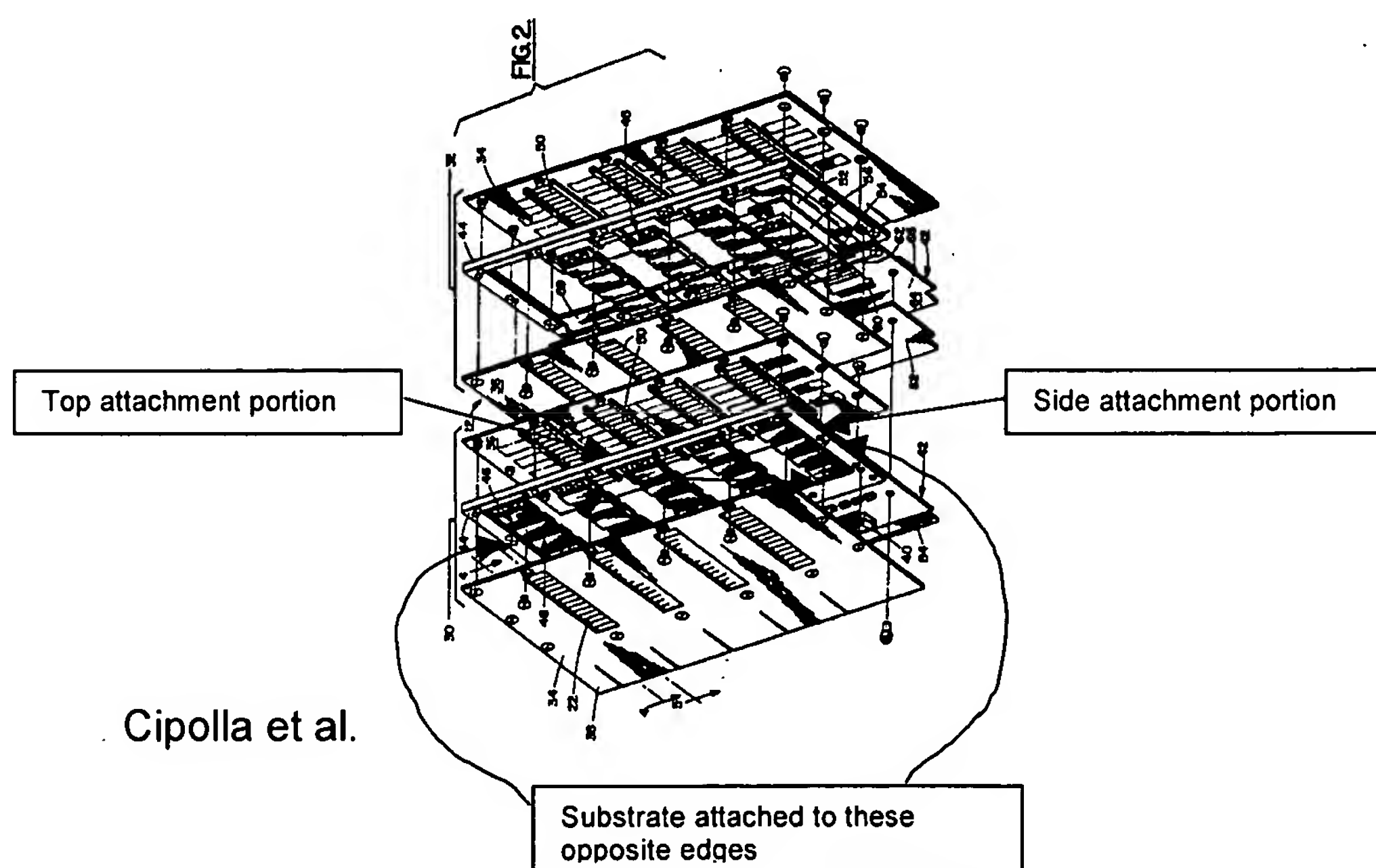
- Regarding claim 15, Cipolla et al. disclose all the limitations in claim 13. Cipolla et al. does not expressly disclose an attachment portion that comprises less than an entire length of the opposite side of the substrate. At the time the invention was made, it would also have been obvious to one of ordinary skill in the art to use a second heat transfer plate that was a duplicate of the first heat transfer plate when packaging singular memory packages, and to attach the substrate along less than an entire length of the opposite edge of the substrate to allow for extended slots that are provided to increase air flow.
- Regarding claim 16, Cipolla et al. disclose all the limitations in claim 14. Cipolla et al. does not expressly disclose attachment portions that further comprise upper side portions along upper portions of the sides of the substrate. At the time the invention was made, it would also have been obvious to one of ordinary skill in the art to use a second heat transfer plate that was a duplicate of the first heat transfer plate when packaging singular memory package, thereby providing attachment portions that

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further comprise upper side portions along upper portions of the sides of the substrate.

- Regarding claim 17, the thermally enhanced memory module disclosed by Cipolla et al., as modified to package a singular memory package by using a second heat transfer plate identical to the first heat transfer plate would satisfy the limitations of this claim.
- Regarding claim 18, Cipolla et al. disclose all the limitations in claim 17. Cipolla et al. further discloses different connection mechanisms (column 6, paragraph 34-35). Cipolla et al. does not expressly disclose the substrate to be of PCB material. At the time the invention was made, it would also have been obvious to one of ordinary skill in the art to use PCB material for the substrate, to reduce the cost of the memory module.

5. Claims 19-20 rejected under 35 U.S.C. 103(a) as being unpatentable over



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- Regarding claim 19, Cipolla et al. discloses a memory module comprising: memory means for storing data (58); substrate means for supporting the memory means (42+52+54+56); fastener holes in the substrate means; contactor means along a contactor edge (84) of the substrate means, for making electrical contact when the memory module is inserted into a socket (18), wiring means, within the substrate means, for electrically connecting the memory means to the contactor means (column 3, paragraph 11-13); heat-sink means, made of heat conducting material, for dissipating heat from the memory means (column 3, paragraph 6-9); depression means, in the heat-sink means (depression 34 formed when 34 and 44 together to form the first heat transfer plate), for thermally contacting the memory means (column 3, paragraph 7-9); top attachment portion means, in the heat-sink means and along an opposite edge of the substrate means, for physically contacting the substrate means along the opposite edge (as marked in the figure above); fastener means, attached to the top attachment portion means; and opposite-edge slot means, for allowing air flow through the heat-sink means between the memory means and the opposite edge, whereby air-flow under the heat-sink means is improved by the opposite-edge slot means. Cipolla et al. does not expressly disclose the fasteners

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on the top attachment portion that passes through the fastener holes in the substrate, and opposite-edge slots locations between the top attachment portion and the depression. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to fixedly attach the heat sink to the substrate through fasten holes in the top attachment portion also, to increase the rigidity of the substrate, and to include slots between the top attachment portion and the depression to increase air flow through the module.

- Regarding claim 20, Cipolla et al. discloses the limitations of claim 19, and further discloses a heat- sink means that comprises a first sink means (34 + 44) for attaching to a first surface of the substrate means and a second sink means for attaching to a second surface of the substrate (36).

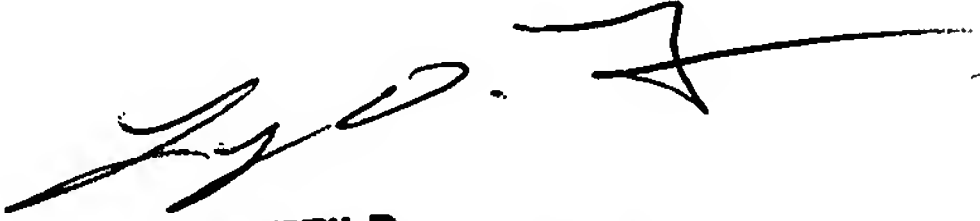
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Biju Chandran whose telephone number is (571) 272-5953. The examiner can normally be reached on 8AM - 5PM. Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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